Curriculum Guide

for

I N D U S T R I A L A R T S

G E N E R A L

10 - 20 - 30

CURRICULUM

TT
168
A34
1965

CURRGDHT

Department of Education

Edmonton, Alberta

September, 1965

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INDUSTRIAL ARTS GENERAL

Introduction

The Industrial Arts General course is designed to meet the needs of two groups of students; those that can benefit from additional exploration in greater depth of content in a number of selected areas before enrolling in vocational courses and two; those that wish to broaden their understanding of the major technologies and gain more skill in the crafts. In the latter case the organization and accomodation is such that the general program can best be carried out in a multiple activity laboratory.

Through this program students are able to work in an environment which is conducive to challenging their intellect and talents in a number of technical and craft areas. Students become aware of the interrelationship and the dependency of one technology upon the others. They have the opportunity to develop broad concepts of the principles and skills required in the various occupations. Students will find it necessary to apply many of the skills they have developed in other school subjects to the solution of practical, personalized problems.

This course can contribute greatly to achieving the objectives of secondary education in this province.

General Objectives

Industrial arts is a part of general education and as such instructors need to understand the objectives of the Alberta education program.

A. Functional Objectives of the Alberta Secondary Schools

Personal Development

The prime aim of the school is to assist each Alberta youth in his growth towards maximum self-realization. The following definite goals are included under this heading:

i. Health and physical fitness.
ii. Mental health.

iii. Intellectual achievement.
   a. Ability to think rationally, to express thought clearly and to read and listen with understanding.
   b. A broad understanding of the methods of science, its major findings and its influence on human affairs.
   c. A broad understanding of the fundamental principles of mathematics and their importance in daily living; a mastery of mathematical skills necessary for vocational competence.
   d. An understanding and appreciation of cultural heritage.

iv. The development of suitable recreational and leisure time activities.

v. The development of character manifested in sound habits of behavior in social relationships.

vi. The development of a pattern of values, attitudes, and ethical ideals which furnish justification for good habits and culminate in a philosophy of life which recognizes the importance of religion.

Growth in Family Living

Each Alberta youth must learn to appreciate the unique and indispensable place in society played by the home and family and especially the influence of the family unit upon right thinking in connection with morals, institutions, and the current issues of democratic living. The school should assist him to achieve a better understanding and appreciation of:

i. The responsibilities and privileges of the members of the family group.

ii. The home as a democratic institution.

iii. The conditions essential to successful family life.

iv. The opportunities for enjoyment at home.

v. The functions and responsibilities of parents.

vi. The relationship of the family to its neighbors and the community.

Growth Toward Competence in Citizenship

Each Alberta youth must be brought gradually to a realization of his position and responsibilities in the school, community, province, nation, and finally in the community of nations. The school should guide him in:

i. Acquiring insight into the historical background of contemporary society.
ii. Developing competence in meeting, and attempting to solve, public problems and issues which citizens are required to encounter and on which they must take action.
iii. Developing competence in political action at the school, community, national and world levels.
iv. Developing consumer competence.
v. Developing democratic attitudes and behavior in all social situations.
vi. Establishing loyalty to the ideals of democracy and acquiring an appreciation of his community, the province and the nation.

Occupational Preparation

The school must help each Alberta youth to develop those understandings and attitudes that will make him an intelligent and productive participant in economic life; and assist him to develop saleable skills, or prepare for post-school vocational training. The youth should:

i. Become familiar with the range of vocational opportunities open to him.
ii. Learn how to take full advantage of the school and extra-school guidance services.
iii. Achieve an acceptance of his own capacities as indicated by professional analysis of interests, socio-economic status, aptitudes, personality, and native intelligence.

Objectives of the Senior High School Industrial Arts Program

The Industrial Arts program helps to attain the functional objectives of Alberta Secondary School Education as set forth above.

Within the scope of these general objectives the unique contributions made possible through Industrial Arts courses are summed up in the following objectives:

Industrial Arts courses will provide an opportunity for students:

1. To develop an understanding of related technological clusters and the interrelationship of the technologies within the cluster areas.

2. To develop an understanding of the applications of the academic disciplines in an industrial environment.

3. To study and work in an environment which stimulates the individual to discover and develop his interests and talents.

4. To develop an understanding of man's changing role in an advancing industrialized society.

Definition of Terms

1. Multiple Activity Laboratory - a laboratory or shop where three or more activities are in progress at the same time.

2. Area Laboratory - a laboratory in which a cluster area is taught, e.g. Electronics 10, 20, 30 would be taught in an Electronics laboratory; Materials in a Materials laboratory.

3. Cluster - or cluster area - the technologies and crafts that are closely related are grouped in clusters. Four main clusters have been developed in the Alberta Senior High School Program.

   Electronics - made up of Electricity, Electronics, Computer

   Materials - Wood, Metal, Plastics, Craft Materials

   Graphic Communications - Drafting, Photography, Printing, Duplicating

   Power Mechanics - Vehicle Maintenance, Power Sources, Electrical Systems, Power Transmission

4. Course Unit - a unit consists of from 9 - 10 weeks of work in a specific area. All the Industrial Arts courses both the General and the Cluster courses have four units of work each year.

Description and Scope of the Program

The four units that comprise a year's work in each of the three years the program is taught are selected from a total of twenty-one. The selection is made as follows: Units must be choosen from three different cluster areas. Two units may be chosen from one cluster and the other two from two different clusters. The special units cluster does not represent any special technology or craft but supplies units to make the course more flexible, especially in shops with limited facilities. Different units must be chosen for each year of the program.

For students using the Industrial Arts General course for guidance purposes as an introduction to vocational should be given units chosen from the first four clusters.

Scope

The Industrial Arts General courses 10, 20, 30 are a series of four - five credit courses built up by selecting four units from three different clusters as listed below. The numbering 10, 20 and 30 is determined by the number of units the student has completed. The first four units are designated Industrial Arts General 10, the second four or total of eight are Industrial Arts General 20 and the third four become Industrial Arts General 30.

A	Electronics	1. Basic Electricity-Electronics 2. Circuits and Meters 3. Introduction to Electron Tubes and Semi Conductors 4. Sources of E.M.F.
B	Materials	5. Wood 6. Metals 7. Plastics 8. Crafts or Textiles
C	Graphic Communications	9. Drafting 10. Printing (Process) 11. Photography 12. Duplicating
D	Power Mechanics	13. Vehicle Maintenance 14. Power Sources 15. Electrical System 16. Power Transmission
E	Special Units For Industrial Arts General	17. Research 18. Production Science 19. Hot Metals 20. Building Construction 21. Food Science

Many instructors will find it advantageous to offer the general course as well as a cluster course. When this is done units for the general course should be chosen from the clusters other than the one taught as a cluster, e.g. if Electronics 10 is to be offered in conjunction with Industrial Arts General 10 to the same students then the units selected for Industrial Arts General 10 should not include any Electronics.

Some Suggested Unit Selections

1. In centres offering Industrial Arts General 10 only:

   Unit 1, 5, 9, 13
   or
   1, 6, 11, 13
   or 1, 7, 10, 17 or 18
   or 5, 8, 9, 21
   or etc.

2. In centres offering Industrial Arts General 10 and 20:

   Industrial Arts General 10 - Units 5, 6, 9, 13
   or
   1, 5, 9, 13

   Industrial Arts General 20 - Units 1, 2, 11, 17
   or
   2, 6, 10, 18
   etc.

3. In centres offering Industrial Arts General 10, 20 and 30:

   Industrial Arts General 10 -- 5, 6, 9, 13 or 7, 8, 11, 17

   Industrial Arts General 20 -- 1, 2, 7, 11 or 5, 6, 10, 13

   Industrial Arts General 30 -- 3, 4, 8, 10 or 1, 2, 9, 19

4. Centres wishing to offer an Industrial Arts, General course that utilizes both the Industrial Arts and Home Economics laboratory can select the units Textiles and Foods to be taught in the Home Economics room and two other units like Wood and Drafting or some other combination to be taught in the Industrial Arts laboratory.

Shop Organization and Equipment

In a single comprehensive general shop or multiple-activity laboratory the units will be taught by planning activities in three or four different areas to be carried on simultaneously. In this way both equipment and space can be utilized to best advantage.

Each unit requires nine to ten weeks of work. The class should be divided into four groups with each group completing the learning experiences planned for each unit before moving to the next.

Equipment should be available to satisfactorily complement the instruction content before such a unit is attempted.

Transition

The Industrial Arts General sequences of courses will replace General Mechanics 15, 16 and 17. No serious difficulties should be encountered in offering the new program, especially if the junior high school program has been provided for. Special allowances will be made during the transition period (to 1976). The Supervisor of Industrial Arts, Department of Education,must be notified of deviations from the standard program or credits may be withheld.

How To Use This Guide

Once you have selected the units for each year's program determine which and how best you can meet the objectives of Industrial Arts. Each unit is written to indicate the activities a student does under the "do" column and the information he should acquire under the "know" column. The numbers in both columns are matched so that the appropriate learning experience takes place after the related information has been acquired.

Method of Procedure

1. Select the units you plan to teach in each grade.

2. Study each unit. Read the material in the reference books and manuals. Then develop a series of lessons or activities to cover the content in the "know" column. Plan appropriate student activities as suggested in the "do" column.

3. Select or prepare audio-visual materials such as films, filmstrips, charts, etc., that will reinforce your lesson material.

4. Develop instruction sheets where they can be used to best advantage.

5. Study the requirements in equipment and materials so that these can be arranged for in time.

6. Prepare a tentative plan for the whole year. Use it as a guide. Have dates for unit changes set and try to remain on schedule.

7. Prepare a daily plan and list all lesson topics and students activities a week ahead of time.

Administration

1. Time - Each of these courses may be offered for four - five credits. The number of minutes required per credit should conform with the regulations described in the Senior High School Handbook.

2. Scheduling - Industrial Arts courses can be satisfactorily taught in blocks of time from 60 to 160 minutes. Double period blocks twice a week have proven very good.

3. Class Size - A maximum class size of twenty is suggested. When student numbers go beyond that, student and teacher efficiency is seriously hampered because of insufficient space and equipment. Industrial Arts laboratories in this province are not planned to cope with numbers larger than twenty.

4. Records - Every instructor should keep the following records:

   (a) Enrolment and attendance
   (b) Daily lesson plan
   (c) Yearly plan
   (d) Record of student achievement
   (e) Inventory of equipment and supplies.

   It is recommended that the records be kept in a simple, efficient manner.

5. Student Evaluation - Evaluation must be based on what the student has learned "know and what he has done "do". The following is a suggested criteria for grading students.

   Related Theory - tests, written exercises, reports ("Know" Column) 50%

   Activity - projects experiments, operations performed ("Do" Column) 50%

Safety Program

Every shop must have an effective safety program. This does not mean that the promulgation of a set of rules and regulations will satisfy this end. Students must be taught in each and every subject studied within the industrial arts framework, the "hows and whys" inherent in the safety program. It is the responsibility of the instructor to supply continuous and vigilant supervision and to ensure that all students engage in only safe shop practices. A good safety program would include:

1. Regular and thorough instruction and revision.

2. Constant vigilance.

3. Checking and evaluating of student safety habits by the instructor.

4. Complete first aid equipment kept in first-class condition.

5. Non-skid paint and clearly marked working areas around all machinery.

6. Proper clothing with particular attention to eye protection.

7. Machines and tools in good working condition.

8. Routine reporting of all accidents.

9. Good housekeeping.

The following is a sample of safety regulations which the instructor might be expected to enforce:

1. No power machines shall be used by any student before specific instruction has been given with regard to safe operation and safety precautions.

2. No power machine shall be used while the instructor is absent from the shop.

3. No machine shall be used by any student unless adequately guarded.

4. Approved eye protection must be worn for certain operations.

Note: A good safety slogan which should be put into practice at all times - a place for everything and everything in its place.

There are five basic steps in safety education:

1. Set a good safety example for student.

2. Instruct each student thoroughly in the safety precautions of his job.

3. Keep all tools sharp and in good condition.

4. Keep all safety devices in proper use.

5. Follow up safety instructions constantly. The shop will be as safe as the instructor makes it.

Dress and deportment play an important part in the operation of a safe shop program. Students and instructor should be neatly dressed at all times and the instructor should take care to ensure that no loose and dangerous clothing is worn. Safety aprons, goggles, gloves, should be used wherever necessary.

It should be pointed out that failure to comply with every reasonable safety precaution, may jeopardize the instructor's position in any claim for compensation. Each school should receive the excellent publications and bulletins dealing with accident prevention and safety procedures distributed by the Workmen's Compensation Board.

Note: Accidents must be promptly reported to some senior school authority. If no other person is designated, this authority is the Principal.

A. ELECTRONICS

BEGINNING ELECTRICITY AND ELECTRONICS

Objectives

1. To investigate and observe the effects associated with electrons at rest and in motion.

2. To show the application of these principles to the field of electronics.

Course Content

What the student should be able to:

DO	KNOW
1. Demonstrations to show laws of charges and capacitor action.	1. Introduction to the world of electronics.
2. Experiments to show degrees of retentivity of magnetic materials (BEl/AM pg. 11,14) e.g. mild steel - hardened H.C. steel, magnetize and demagnetize screwdriver (FE/T).	2. Review of Electrostatics. (BElc/AM).
3. Assignments 21, 22, and 23. (FE/T).	3. Electrical conduction in: (a) Solids - conductors - semi-conductors - insulators (b) Liquids - ionization (c) Gases - ionization (d) Vacuum - electron emission.
	4. Effects of electron flow. (BElc/AM Ch. 4) - Thermal - Luminous - Chemical - Magnetic - Applications.

DO	KNOW
	5. Electromagnetism. - Field about a current carrying conductor - Left hand rule - Field about parallel current carrying conductors - Helix - Solenoid and left hand rules to determine polarity - Applications - telephone - relays circuit breakers - motors - bells chucks - starter solenoids - tape recording - Hammond organ microphone - door locks, etc.
6. Move permanent magnet through coil connected to galvanometer. Design experiments to show factors affecting strength of induced current. (Assignment 24, FE/T - pg. 25).	6. Electromagnetic Induction. - Factors affecting strength of induced current - Left hand rule to determine direction of induced electron flow - Lenz's Law - Simple A.C. Generator - The Sine Curve - Self Induction - Mutual Induction - Applications Ignition coil-transformers - Capacitor action used to prevent arcing at points.
7. Two coils magnetically coupled - one connected to galvanometer, move bar magnet through center of primary - note galvanometer deflection.	

Reference Key

BElc/AM - Basic Electricity (A. Markus) Prentice-Hall.

BEl/AM - Basic Electronics (A. Markus) Prentice-Hall.

FE/T - Fundamentals of Electricity (Thwaits) McGraw-Hill.

CIRCUITS AND METERS

Objectives

1. To teach the language of electricity and electronic circuitry and the use of the basic instruments used in exploring and testing circuits.

Course Content

What the student should be able to:

DO	KNOW
1. List various magnitudes of currents voltages, resistances as they apply to: - Lightning - Power distribution systems - Household appliances - Automobiles - Threshold of feeling 0.003 amperes.	1. The basic circuit (e.g. source load, control conductors, safety device) (BE1/M pp 7-23) (BE1/Grob pp 8-36).
2. List wattages of various electrical devices.	2. Schematic symbols and rules for drawing circuits.
3. List Alberta power distribution voltages.	3. Electrical units. - Coulomb - Ampere - Volt - Ohm - Watt.
4. Read resistance of various resistors and check their value and tolerance with the ohmmeter.	4. Prefixes. - Pico, nano, micro, milli, kilo, mega, giga, tera. - give practical examples of these prefixes, avoid e.g. megafarad. Resistor color code.
5. Bell or lamp circuits (BS pg. 25).	
6. Assignments 5 to 9 and 11 to 14 or equivalent (FE/T) (Suggest "Or" "And" circuits).	6. How to multiply and divide on the slide rule.

DO	KNOW
	7. The series circuit. - Meaning of series as it applies to circuits and components. (switches, loads, sources) - Relationship between I, E and R - Use of Ohm's law in solution of problems - Computer "And" circuits (Bel/Dover ch. 18, 19) (MEW/K chm. 4).
	8. Parallel Circuits. - Meaning of paralleling as it applies to switches, loads, sources - Application of Ohm's law in determining E, I and R - Computer "OR" circuit (IE/ZS).
	9. Meters - general information. - Care of sensitive meters - Reading of scales and interpreting dial settings - Selecting ranges - Handling probes.
10. Measure current in series and parallel circuits to verify current relations in parallel circuits and that current is the same in each part of a series circuit.	10. Current Meters. - Connection to circuit (polarity, series) - VOM and Multirange current meters.
11. Measure applied and voltage drop in circuits to verify Kirchoff's and Ohm's law. e.g. see Zbar & Schildkraut for typical circuits and problems (lab manual by McGraw-Hill).	11. Voltmeters. - Connection to circuits (polarity) - VTVM, VOM .
	12. Ohmmeters. - Connection (precaution - never use a live circuit) - Checking continuity - Measuring Resistance - Voltmeter ammeter method of determining resistance.

Reference Key

BEl/M - Basic Electronics (Markus).

IE/ZS - Industrial Electronics (Zbar & Schildkraut) McGraw-Hill.

BEl/Dover - Basic Electronics (Dover Pub. Inc., N.Y.).

FE/T - Fundamentals of Electricity (Twaits) McGraw-Hill.

BEl/Grob - Basic Electronics (Grob).

BS - Buban, Schmidt, Understanding Electricity & Electronics, McGraw-Hill.

MEW/K - Making Electricity Work (John M. Kennedy) Thomas Y . Crowell Co. N.Y.

INTRODUCTION TO ELECTRON TUBES AND SEMI-CONDUCTORS

Objectives

1. To develop knowledge of the principles of electron tubes and semi-conductors and some of their applications.

Course Content

What the student should be able to:

DO	KNOW
1. Dismantle tubes.	1. Vacuum tubes. - Construction - Sockents and pin numbering - Basing diagrams - Types, diodes triodes - Types of electron emission - Space charge and its effect - Conduction in vacuum tubes (RCA/tm) (EK-2A) (ABCR/GE).
2. Hook up heater circuits.	2. Care of delicate miniature and subminiature components.
3. Show Edison effect by measuring IR. drop across a plate load resistor.	3. Rectification and detection - Electron tube diode (development).

DO	KNOW
4. Calculate vacuum tube diode resistance plate positive and then with the plate negative to demonstrate rectifier action.	4. Amplification . - Vacuum tube triodes (development) - Control grid action - Need for load resistor - Grid bias - Input voltage compared to output voltage .
5. Measure forward and reverse resistance of semi-conductor diode.	5. Transistors. - Terminology and basic construction - Common emitter amplifier (EK-3).
6. Draw curve of sine wave as observed on oscilloscope before diode and after diode.	
7. Diode in series with lamp as a dimming device. (Switch across diode enables lamp to burn full brilliance when desired).	
8. Use of diodes to control two lights on one line independently.	

Reference Key

BT/S - Basic Transistors (Schure) Rider.

Film - "The Triode" Audio Visual Aids Branch, Department of Education
RCA/tm - RCA tube manual.

EK-2A - Manual from Heath Co. comes with their Educational Kit.

ABCR/GE - ABC's of Radio - General Electric.

EK/3 - Transistor manual from Heath Company.

SOURCES OF E.M.F.

Objectives

1. To explore the methods of producing electromotive force.

Course Content

What the student should be able to:

DO	KNOW
1. Generate AC by moving a permanent magnet through a coil connected to a galvanometer.	1. Elementary AC and DC generators. - Electromagnetic induction - Left-hand rules for generators - Essential parts of - Theory of operation and generation of sinewave voltage - Terms associated with the generated sine wave voltage e.g. cycle, frequency, period peak, rms., average - Application of generating machinery e.g. auto, welders, dynamotors, commercial power plants. - Alberta map of power plants and power output of each (contact Calgary Power) (obtain map from Department of Economic Affairs, Edmonton entitled "Province of Alberta Resources and Development."
2. Hook up simple single coil generator to galvanometer and rotate slowly to show generation of AC.	2. Chemical Sources. - Primary cells, ionization, polarization, depolarization agents. - Types of primary cells - voltaic zinc, carbon, mercury - Secondary - lead, acid, cadmium sulphide, Edison cells - Charging - rate, specific gravity safety in charging and handling - Construction of present day automobile batteries and their care.
3. Trace energy cycle from fuel source through generating plant to load where electrical energy is made to work for us.	

DO	KNOW
4. Experimentation with various metals and electrolytes to explore voltage output e.g. coins in lemon.	
5. Measure specific gravity of several solutions of different sp. gravity. (Not necessarily acid solutions).	
6. Make and charge a simple lead acid cell - show that its output will light a small lamp. BS pg. 218.	
7. Hook up a circuit and measure open and closed circuit voltage of the battery. Determine internal voltage drop and internal resistance.	
8. Apply load test to available car batteries. Check manufacturer's specifications.	
9. Circuits to show voltage producing ability of photovoltaic cells. EBE/Porter, Pg. 51 B3M - International Rectifier Co.	9. Photovoltaic cells. - Selenium - Silicon and boraon - Silicon and arsenic.
10. Demonstrate output of crystal cartridge, microphone, etc.	10. Piezo-electric. - Crystal materials, rochelle and quartz - Applications, microphones, earphone, phonocartridges.
11. Heating of junction of dissimilar metals to show production of voltage.	11. Thermo-electric. - Contact potential - Types of materials used - Thermo-couple and thermopile - Applications.
12. Distinguish between photovoltaic and other types of light sensitive cells.	

Reference Key

EBE/Porter - Experimental Basic Electronics (Evans and Porter)
McKnight & McKnight.

BS - Understanding Electricity & Electronics (Buban & Schmidt)
McGraw-Hill.

B. MATERIALS

WOOD TECHNOLOGY

Course Content

What the student should be able to:

DO	KNOW
Layout and Design	
1. Do exercise based on blueprint reading.	1. How to read blueprints. - lines and symbols - types of projections.
2. Use measuring tools. - rule - try square - tape.	2. How to layout work in wood.
3. Use a marking knife, compass, dividers and marking guage.	
4. Find examples of wood products that have good design.	4. Principles of good design. - balance - proportion - simplicity - proper selection of material and finish.
Sources and Applications	
5. Write out characteristics, source and best use of a number of selected woods. (a) Make tests comparing strengths of various woods.	5. Identification of common woods. - pine - fir - poplar - maple

DO	KNOW
	5. Identification of common woods (cont.) - birch - mahogany - walnut - ash - willow - red gum - cedar.
Hand Processes	
6. Condition a jackplane. - sharpen blade - tighten handles - adjust frog.	6. Care of edge tools. - personal safety - protection of cutting edges - prevention of breakage - tool conditioning.
7. Sharpen a chisel.	
8. Sharpen a bit.	
9. Tighten handle on a saw.	
10. Cut with a crosscut.	10. How to select and care for sawing tools (crosscut, rip, keyhole, coping, back).
11. Cut with a ripsaw.	
12. Cut with a backsaw.	
13. Adjust plane.	13. How to select and use bench planes.
14. Plane faces.	
15. Plane an edge.	
16. Plane an end.	
17. Square a board.	
18. Plane a chamfer.	
19. Plane a bevel.	
20. Pare with a chisel.	20. How to select and use a chisel.
21. Bore vertical and horizontal holes.	21. How to select and use boring tools.

DO	KNOW
22. Bore a hole to depth.	
23. Cut with a coping or jig saw.	23. How to select and use tools to cut odd shapes.
24. Use a spakeshave to smooth inside curves and convex edges.	
25. Sand flat surfaces.	
26. Grind a chisel.	26. How to use the grind stone. - types of stones - speeds - cooling.

Machine Processes

27. Use a band saw to cut curves in heavy stock.	27. Select and use abrasive papers. - garnett - flint - grit sizes - sanding blocks.
28. Turn a face plate project using correct hisels.	28. How to use the lathe for - faceplate and spindle turning - speeds - use of chisels - safety precautions.
29. Rip with the circular saw.	29. How to use the circular saw for ripping and crosscut. - use of guards - safety precautions.
30. Crosscut with the circular saw.	
31. Edge plane a board.	31. How to use the jointer. - surface plane - edge plane - safety precautions.
32. Surface plane a board.	

DO	KNOW
Fasteners	
33. Fasten material with glue.	33. How to select and use fasteners. - glues - kinds, uses - screws - types, sizes - nails - types, sizes.
34. Test glue strength.	
35. Drive and set a nail.	
36. Drive a screw.	
Finishing	
37. Apply wood filler.	37. Common wood finishes.
38. Apply sealer.	
39. Apply oil finish.	
40. Apply varnish finish.	
41. Apply wax.	
42. Polish a finish.	
Occupational Information	
43. Study your community and name all the people you know doing work that requires the skills of a carpenter.	43. Vocational areas related to wood-working.

METAL

Course Content

What the student should be able to:

DO	KNOW
Blueprint Reading - Layout & Design	
1. Sketch project.	1. Understanding a working drawing.

DO	KNOW
2. Dimension.	
3. Make material list.	
4. Layout project.	4. How to mask metal - procedure steps.
	5. Function and design from materials aspect.
Materials, Sources & Application	
	6. The history of metals leading to the development of iron and steel.
7. Examine types of iron ore, coke, and limestone.	7. The iron ores - Hematite, Magnetite, Limonite, Taconite and their composition. - world distribution - methods of mining - transport - refinement - screening, washing, calcining, sintering, flotation.
8. Take a piece of pig-iron or cast-iron. Break, file, polish, etch and examine under a microscope.	8. The Blast Furnace - History, construction and operation. - pig-iron and its constitution - crystal formation of pig-iron - slag and its uses or disposal - the cupola furnace and the production of cast iron - cast iron techniques.
9. Cut a piece of wrought iron - if available - and mild steel, polish and observe under the microscope.	9. Refining pig-iron. - the puddling furnace - Seimens open hearth regenerative furnace - Bessemer converter - crucible furnace - electric arc and induction furnaces - construction, operation and products of these furnaces - methods of producing rods, bars, strips, sheet, tubes and wire, both hot and cold.

DO	KNOW
Hand Processes	
10. Lay out patterns on sheet metal and bar stock using - steel square - steel rule - scriber - divider - trammel points - hemaprodite calipers - marking ink.	10. Layout procedures and tools.
11. Make sheet metal joints and seams.	11. How to use and care for hand tools.
12. Use setting hammer.	
13. Use hacksaw to square stock.	13. How to use the hacksaw. - blades.
14. File metal to line.	14. How to use files. - kinds - cuts - care.
15. Drill a hole in metal with a hand drill.	15. Use and care of hand drills. - sizes - damping.
16. Fold, bend and bun metal.	16. How to shape metal using stakes.
17. Punch hole in sheet metal with a chassis punch.	17. Use and care of chassis punch.
Fasteners	
18. Prepare metal for rivetting.	18. Kinds of fasteners and uses. - rivets - machine screws - bolts, etc.
19. Use a rivet set.	19. Techniques of rivetting.
	20. Types - tin, lead content.
21. Soft solder tin plate.	21. How to solder.
22. Tin a soldering copper.	

DO	KNOW
	23. Types of fluxes.
24. Use bolts to fasten metal parts.	24. Use of bolts - common types N.C. N.F.
25. Cut threads with a die.	25. How to use a tap and die set.

Machine Processes

26. Drill holes in metal with high-speed and carbon drills.	26. How to use the drill press. - speeds - clamping
27. Sharpen a drill.	27. Types and uses of drills. - sizes - sharpening - clearance.
28. Grind metal for welding.	28. How to use the grinder. - types of stones - safety precautions.

Occupational Information

29. Make a study of one firm that fabricates metal projects to discover skills and training required.	29. Occupations dealing with metal work.

Finishing

30. Applying metal finishes. - prepare surface - apply primer - apply paint.	30. Types of finishes and their application.

PLASTICS

Course Content

What the student should be able to:

DO	KNOW

Layout & Design

1. Choose projects using acrylics and butyrates.	1. (a) History of acrylics and butyrates. (b) Terminology used in plastics.

DO	KNOW
2. Interpret drawings.	2. Basic reasons for design.
Materials, Source & Application	
3. Identify: acrylics vinyls, butyrates.	3. (a) Classification of plastics. (b) Sources of plastics.
4. Layout work on plastic.	4. Methods of layout on plastic.
5. Care for hand tools used on plastics.	5. Types and uses of hand tools for plastics.
6. Cut-out stock.	6. Tools and methods for cutting plastics.
7. Square stock.	7. Procedure for squaring stock.
8. File plastic.	8. Care and types of files used for acrylics. - kinds - cuts - care.
Machine Processes	
9. Drill plastics.	9. Types and care of drills used for plastics. - size - clearance - sharpening.
10. Cut plastics with band and jig saws.	10. (a) Safe operation of power tools used on plastics. (b) Power tools used on plastics.
11. Shape plastics with lathe.	11. How to care for and adjust power tools used for acrylics.
12. Sand plastics.	12. Types and uses of sandpaper for plastics.
13. Bend acrylics with heat.	13. How to heat plastics for bending.

DO	KNOW
Fasteners	
14. Join plastic with cements.	14. Types and application of plastic cements.
15. Join plastic with solvents.	15. Types and application of plastic solvents.
16. Join plastics mechanically.	16. Mechanical fasteners for plastics.
Finishing	
17. Inlay plastics.	17. Differences between inlay and overlay.
18. Overlay plastics.	
19. Color plastics.	19. Methods of coloring plastics.
20. Buff plastics.	20. Methods of buffing plastics.
21. Polish plastics.	21. Polishes and methods of polishing plastics.
22. Experimentation and testing of plastic.	22. Safe techniques of working with acrylics.
Occupational Information	
23. Report on place of plastics in industry today.	23. (a) Plastics used in industry. (b) Fields of employment in plastic industries.

Projects

1. Various pulls
2. Keychain ornaments
3. Letter openers
4. Dress clips
5. Jewelry
6. Tie clasps
7. Picture frames
8. Bracelets
9. Candle holders
10. Cigarette boxes
11. Jewelry boxes
12. Letter holders.

INDUSTRIAL CRAFTS

Leather

Course Content

What the student should be able to:

DO	KNOW
Layout & Design	
1. Prepare a design for a project.	1. How to design in leather.
Materials	
2. Select leather for project.	2. Kinds and uses of leather.
3. Layout and cut leather.	3. Methods used for laying out and cutting leather.
4. Moisten leather.	4. Preparation of leather for tooling and carving.
Hand Processes	
5. Condition sharper and store tools.	5. Care of tools.
6. Transfer design to leather.	6. Various ways to transfer designs to leather.
7. Use a swivel knife to carve.	7. Methods of using the swivel knife.
8. Follow tool sequences. - cutting - beveling - background.	8. The proper tool sequences.
9. Use edge creaser.	9. How to do edge creasing.
10. Skive leather.	10. Why and how to skive.
11. Lace using the double buttonhole stitch.	11. Types of lacing.

DO	KNOW
12. Sew leather.	12. How to fasten parts. - sewing - rivets - glues - snaps.
13. Cement leather.	
14. Use rivets.	
15. Use snap fasteners.	

Finishes

16. Finish with: - dyes - liquid wax - leather sealer - oil.	16. Application of finishes.
17. Clean leather articles.	17. Correct care of leather articles.

Occupational Information

18. Write a report on a leather industry in Alberta. e.g.-shoe factory in Edson -saddlery in High River.	18. What leather industries there are in Alberta and Canada?

Projects

Billfolds, belts, handbags, etc.

Textiles

Introduction

The study of textiles will give an intelligent appraisal of standards and brands of merchandise, an ability to distinguish quality in fabric and the proper use of different qualities.

The history and cultural association as well as the handling of fabrics becomes a fascinating study from the source of the raw materials to the way in which the materials are processed and the products distributed.

As a result of this study, the consumer-merchant and the consumer-customer will know how to buy and what to buy. It is important that students have fabrics to handle and compare.

Objectives

1. Develop interest in textiles.

2. Develop a knowledge of (a) natural fibers, (b) man-made fibers, (c) synthetic fibers.

3. Acquaint student with modern equipment - operation and simple service of each.

4. Give some understanding of the numerous fabrics on the market today and the performance of the particular fabric in this ever-changing picture.

Course Content

What the student should be able to:

DO	KNOW
1. Use a microscope or linen tester.	1. Characteristics of fiber, yarn, and fabric.
2. Tests for burning, feeling, breaking and chemical test if possible. Collect labels for synthetics.	2. Identification of natural fibers and some man-made fibers.
3. Yarn count and twist of yarn.	3. The ply of yarn needed.
4. Be able to weave a mat to illustrate plain, twill and satin weave.	4. Know the materials directed to these weaves and why.
5. Bleach and shrink material. Collect samples of each process.	5. Know the finishes and processes used in crabbing, fulling, weighting, napping, and shearing. Crease resistance, water repellency and moth proofing.
6. Dyeing cottons and removing color from fabrics. Dyeing wool.	6. How these are used and type of decoration and color design for each.

DO	KNOW
7. Test wool, strength, heat conductivity absorption, shrinkage, cleanliness, washability, fastness to color, reaction to acid and alkali.	7. Record results of tests.
8. Man-made fiber. Collect samples also blends and mixtures.	8. Advantages of man made and combination fibers.
9. Synthetics made from elements; carbon, air, water.	9. Prospective uses. Samples.
10. Collect samples of materials and pictures from stores, tailors and catalogs.	10. The kind of clothes you need for school, social, sports.
11. Try a variety of products and practice a few grooming techniques. Hand care, shoe care, mend and press clothes.	11. Good grooming habits and products on the market to help clean, deodorize and keep you well-groomed.
12. Study C.A.C. and apply and compare stores and catalog standards.	12. How to buy and what to buy.
13. Service sewing machine, thread machine, learn parts by using. Sew at least two articles in suggested list.	13. Operation and care of sewing machine and pressing equipment.
14. Plan budget and list clothes needed.	14. Value of clothing dollar.
15. List local firms working with textiles and employment opportunities.	15. Employment opportunities. - automobile industry - upholstery - home furnishing - interior decorating - mercantile field of buying and selling - managers, buyers, shop operators, specialist shops, ready to wear, yard goods and notions - drapery - tailoring - repair and mending in laundry and hospitals - inventing and processing materials from raw materials to fiber and fabrics.

Ceramics

Introduction

Ceramics is one of the oldest crafts known to mankind. There are many references to this activity in ancient literature as well as in the Bible. It remains one of the outstanding industrial enterprises in this modern technological world. This craft also is a source of interest to persons concerned with the avocational or leisure phase of living.

This course will provide students with an insight into the manufacture of clay objects as well as develop some basic skill in the manipulation and forming operations in clay.

Course Content

What the student should be able to:

DO	KNOW
	1. Meaning of ceramics. - historical background.
	2. Brief history of pottery.
	3. How to test for good clay.
4. Wedge clay in preparation for use.	4. How to prepare clay for use.
5. Find pictures or samples of the various clay wares.	5. How clay wares differ: - earthenware - stoneware - china - porcelain.
6. Make an article using each of these methods. - coil - propped up slab - draped slab - slab on cylinder with handle and spout - slab on mould - container with lid - form object on potter's wheel.	6. How to form clay.

DO	KNOW
	7. Basic ingredients of glaze.
	8. Meaning of: - opaque - transparent - matt In reference to glazes.
9. Experiment with different types of decoration. - impressed design - inused design - modeled design - underglaze design - multi-glaze effects.	9. Different methods of applying glaze.
	10. How to stack a kiln for firing.
	11. The use of cones in firing.
12. Make a slip mold.	12. How to cast from a mold.
	13. How jiggers and templates are used commercially.
	14. Where ceramic centers are located in Alberta.
	15. The manufacture of brick and tile.
	16. Modern ceramics manufacturing processes.
	17. Occupational opportunities.

Lapidary

Introduction

The advantages of a study of lapidary are many. The lapidary art is one of the oldest in the world and mention is made of the cutting of stones in the Bible. The course should give the student an appreciation of the world around them with particular emphasis on the various types, colours, etc., of rocks. Included is a study of rocks, their hardness, types used for architecture and interior decoration. Interest aroused in archeology and ancient times may well motivate a student in his work in social studies.

In learning about rocks and how and where the different types are found, interest should be stimulated in geography and geology.

Objectives

1. To learn to shape and fit specific stones to specific mounts.

2. An appreciation for the beauty of natural stones.

Course Content

What the student should be able to:

DO	KNOW
1. Use machines properly.	1. Operate and care for machines. (e.g. correct speeds for each operation.)
2. Slab rock.	2. Proper thickness for various sizes of stones. Know how to make appropriate settings on saw. How to tighten vise so rock is secure. Proper weights to be used on machine for slabbing. Cut different way for variety of patterns. Know how to orient rocks, (e.g. tigereye.)
3. Lay out pattern.	3. The different sizes of mounts available. Know how to choose correct pattern. Know which template to use.
4. Mark pattern.	4. Type of pencil used and reason for using this type. How to hold pencil correctly. Know importance of sharp pencil.
5. Trim out cabs and trim saw.	5. Proper method of trimming. Know distance to leave between cutting line and cab.
6. Shape cab to fit mount.	6. How to dress and balance grinding wheels. Amount of water to use on wheels. Know how to choose proper grit size for proper stones. Know correct angles for holding rock for grinding. Know also how to choose proper contour for stone.

DO	KNOW
7. Dop stone.	7. How to prepare wax and stick for dopping. How to choose correct size of stick.
8. Sand stone.	8. Amount of water to use if wet sanding. Know correct method of sanding.
9. Polish stone.	9. Different methods of polishing and different polishing compounds used. - cerium oxide - linde A - chrome oxide - tin oxide Know also the different materials used in polishing - felt - leather - maple wood.
10. Set stone.	10. How to set stone. Proper tool used. Importance of correct bezel.

ART METAL

Introduction

This unit in art metal gives students an opportunity to become familiar with various metals; to develop an appreciation of safe practices in metal work and provides activities where they can use their initiative, experiment, express creativeness and develop a sense of pride in individual accomplishment.

Course Content

What the student should be able to:

DO	KNOW
	1. Early history of art metal trades.
2. Identify non-ferrous metals.	2. Metals used: - aluminum - brass - bronze

DO	KNOW
	2. Metals used (cont.): - copper - monel - nickel silver - sterling silver - pewter - zinc based alloys - stainless steel
3. Design a project.	3. Design in art metal.
4. Use scriber, punches, dividers, sheet metal gauge.	4. Layou procedures and tools.
5. Use the hacksaw, saber saw, snips, drills, punches, files.	5. Methods of cutting, drilling, punching, filing.
6. Anneal copper or aluminum.	6. How to anneal and pickle metal.
7. Do practice jobs in bending, twisting, beating down and raising. This could be part of a single project. (If equipment is available do a metal spinning project.)	7. How to shape art metals by - bending - twisting - beating down - raising - spinning.
8. Decorate small sample pieces of metal 2" x 2" illustrating various decorating techniques. Apply one of these to a project.	8. How to decorate metal. - planishing - fluting - doming - chasing - spotting - stamping.
9. Experiment with various fastening methods and compare strength of joints. - soft solder - hard solder - epony adhesives.	9. How to fasten art metal parts by - soldering - riveting - cementing.
10. Prepare a design and etch into metal.	10. How to etch metal. - type of etching - line etching - area etching.

DO	KNOW
11. Use buffing wheel with various abrasives.	11. How to finish metal projects by - brush finishes - buffing.
12. Discover what tradesman in Alberta use the skills of the art metal work.	

C. GRAPHIC COMMUNICATIONS

Drafting

Specific Objectives

1. To develop the ability to read and interpret plans and blueprints.
2. To develop the ability to make multiview drawings.
3. To develop a basic knowledge of drafting skills and its application to industry.
4. To develop the ability to readily apply drafting as an integral part of the shop situation.

Course Content

What the student should be able to:

DO	KNOW
Geometric Construction	
1. (a) Divide a line into any number of equal parts. (b) Construct a hexagon in a circle. (c) Construct a pentagon in a circle. (d) Draw arc tangent to arc and line. (e) Draw arc tangent to two given lines. (f) Draw ogee or reverse curve.	1. (a) Geometric construction.
2. Do printing plate.	2. Correct lettering procedures.
3. Layout paper.	3. Correct drawing procedures.

DO	KNOW
Orthographic Projection	
4. Review of conventional drafting lines and symbols.	4. Line and symbol conventions.
5. From isometric draw and dimension orthographic (straight lines and angles).	5. Fundamentals of three view projection.
6. From isometric draw and dimension orthographic (curves and circles).	6. Rules of dimensioning.
Isometric Projection	
7. From orthographic view draw and dimension simple isometric (straight lines and angles).	7. Fundamentals of isometric projection.
8. From orthographic view draw and dimension isometric view (circles and curves).	8. Dimensioning of isometric.
	9. Compass method of drawing an ellipse.
Pictorial Drawing	
10. Draw cavalier projection given the orthographic view.	10. Positioning of drawing (largest face or irregular surface to the front).
	11. Approximate compass method of drawing arcs and circles in oblique view.
12. Dimension Cavalier drawing.	12. Dimensioning of projection.
13. Draw cabinet projection given the orthographic view.	13. Offset measurement method of drawing arcs, circles and irregular curves.
14. Dimension Cabinet projection.	14. Dimensioning of projection.

DO	KNOW
Sectional Drawing	
15. Draw full section of some previous drawing.	15. Conventional lines for full and half section.
16. Half section of some previous drawing.	16. Revolved and removed sections.
	17. Section lining code for various materials.
Freehand Drawing	
18. Sketch straight lines.	18. Methods of sketching.
19. Sketch circles and arcs.	
20. Make approximations of measurements and angles.	
21. Make freehand sketch of project in orthographic and isometric.	
Machine Drawing	
22. Draw simple detail and assembly drawing of machine project.	22. Basic machine shop techniques.
	23. Conventional symbols in machining.
	24. Machine allowances.
Electrical Drawing	
25. Draw basic electrical wiring circuits.	25. Conventional symbols.
Tracing and Blueprinting	
26. Trace a machine assembly drawing.	26. Techniques of pencil tracing.
27. Make and develop a blueprint of the above drawing.	27. Blueprinting process.

DO	KNOW
	28. Different types of prints.
	29. Various copying machines.
Sheetmetal Drawing	
30. Develop drawing of small circular scoop.	30. Development of curved surfaces, by projectionof points from the orthographic.
31. Develop pattern for simple funnel.	31. True lengths of conical surfaces.
	32. Development of frustum of a cone.
Blueprint Reading	
33. Read assigned blueprints.	33. Conventional lines and symbols used in all branches of drafting.

Printing Processes

Course Content

What the student should be able to:

DO	KNOW
Typesetting	
1. Draw lines and borders, measure slugs and type to become familiar with measurement.	1. Printers Measurement. Hand Composition Procedures.
2. From a layout of the case study the location of the various characters. On blank layouts write the characters in correct position.	2. California Job Case.
3. Set name to given measure, flush and centred.	3. Use of composing stick.

DO	KNOW
	4. Justification of line.
	5. Dumping of stick.
6. Set name and address centred on given measure.	6. Use of galley.
7. Tie form.	7. Tying a form.
8. Proof and correct type.	8. Proofing a job with planer and mallet.
	9. Wet proofs, dry proofs, proof presses.
10. Distribute type.	10. Distributing type, leads, slugs, reglets.
	11. The reglet case and furniture case.
12. Set a business card with name, address, phone number, proof, correct and tie form and store for later use on platen press.	12. Setting and printing a card.

Course Content

What the student should be able to:

DO	KNOW
Platen Press	
13. Lock up a prepared form using the chaser method.	13. Lock up methods and types. Use of quoins and furniture, accent on chaser method.
14. Cut packing and pack the platen.	14. Preparation of press and of the press packing.
15. Lock up card form, ink press and position card.	15. How to ink the press; position guide pins; wash the press.

DO	KNOW
16. Feed press without inking and without form, but with guides set.	16. How to feed the press.
17. Lock up and run a business card.	
18. From a prepared logotype or machine cast slug;run a memo pad.	18. Paper feeding using grippers.
19. Distribute complete job, wash up and clean up.	19. Distribution of type reglets, slugs and leads.
Rubber Stamp Making	
20. Learn parts and operation of press.	20. What rubber stamp printing consists of - its uses. Type setting for rubber stamp printing.
21. Position a preset job in a chase and lock it up.	21. Positioning of type in chase. Lock up form.
22. Operate machine.	22. Use of shims and compensating blocks.
	23. Effects of heat and pressures on type and on the rubber and matrix boards.
24. Make a matrix.	24. Placement of type in machine, making of matrix.
25. Make a rubber from above matrix.	25. How to make a rubber from a matrix.
26. Make another matrix and rubber.	
27. Mount rubbers made from above jobs. Trim and submit an impression.	27. Trimming of mounts and inserting of handles.

DO	KNOW
Sign Press	
28. Study operation of sign press, its parts and features.	28. Use of sign press and related equipment.
29. Learn position of letters and how they are placed on press.	29. Setting of type and arranging on press.
30. Set single word (name etc.) place on press. Distribute type.	30. Placing of card on press. Pressures of press. Removing card. Removing type, distributing type.
31. Ink press, place a line on press, position type, position card and pull proof.	31. Inking press.
32. Lay out to dry.	32. Drying printed card.
33. Wash press.	33. Washing press.
34. Print a 3-color poster, one color each day, for a dance, concert, club notice, etc.	34. How to use color.
35. Trim the above signs.	35. How to trim.
Design	
36. Collect from magazines, books and papers, type styles and sizes. List according to groups and families.	36. Basic types families.
37. Refer to Nu-Art booklet and list the tools and their uses.	37. Care of tools and their uses.
38. From ATF cards trace a variety of letters noting carefully the shape and form of each letter.	38. Characteristics of type Serifs, Italic, Script.

DO	KNOW
39. Find and draw a sample of display or contrast.	39. Meaning of display or contrast.
40. Find and draw a sample of proportion.	40. Meaning of proportion.
41. Find and draw a sample of balance.	41. Meaning of balance.
42. From given copy make a layout first in rough draft, then by pasting up letters from newspaper. Present a final layout.	42. How to make a layout.

Information concerning suggestions and sources of supplies and material may be obtained by writing to the Jasper Place Composite High School Graphic Arts Department.

Photography

Introduction

These units are designed to provide an introduction to picture-taking and darkroom techniques with emphasis on the place of photography in the broad technical area of graphic arts. The student will be required to learn basic pictorial composition, exposure data, types of films, contact printing and enlarging. Broad photography areas considered here are commercial photography, illustration, portraiture, press photography and industrial photography. The student will be required to keep a notebook, which will contain prints of each picture assignment with brief evaluation of each, as well as information gathered through teacher lecture and demonstration.

Objectives

1. To introduce photography to the student to the point that he will understand the basic materials and processes.

2. To develop a working knowledge in photography.

3. To give the student practice in approved methods and procedures in developing, stopping, fixing, washing and drying films.

4. To acquaint the student with the unlimited opportunities in the photographic industry and its relationship to graphic arts.

Course Content

What the student should be able to

DO	KNOW
Cameras	
1. Organize notebook.	1. Brief history of photography.
2. Obtain examples and indicate the use of the following in your notebook: - box camera - miniature cameras - reflex type camera - press cameras - view cameras.	2. Kinds and use of following cameras: - box camera - miniature cameras - reflex type camera - press cameras - view cameras.
3. Study and identify parts of the camera. - Lense - construction, focal length, light wave properties, aberration, depth of field. - Shutter - focal planes, compur, rapid. - Diaphragm - lens opening, f-rating, directions for using. - Body of the camera. - Focusing devices. - Range finder - split image, superimposed, ground glass, parallel.	3. Parts of a camera and their function.
4. Prepare chart for noting exposure data.	4. How to keep exposure data.
5. List methods of evaluating pictures.	5. Methods of evaluating pictures.
Contact Printing	
6. Using a normal negative, make a series of exposures ranging from 1 second to 6 seconds. Evaluate.	6. How to take a picture.

DO	KNOW
7. Draw the plan of a darkroom.	7. Darkroom layout.
8. Outline the correct procedures for mixing chemicals.	8. Chemicals - procedures in mixing.
9. Make a catalogue of common types of papers and describe each.	9. Paper - size, surface, tone, contrast.
10. Use contact printer.	10. Contact printer - contact frame exposures.
11. Using a normal negative make a contact print on velox ranging from f1 to f4. Analyze.	11. How to develop and fix film.
12. Set film for drying.	12. Drying techniques.
13. Mount picture.	13. How to mount and present photos.
14. Select correct contrast paper and print one underexposed and one overexposed negative.	
Enlarging	
	15. Types of enlargers.
16. Clean and load holder.	16. Operation of enlarger.
17. Adjust light control.	
18. Focus.	
19. Enlarge picture.	
20. Develop test strip using a print scale.	
	21. Types of graded paper.
22. Make an enlargement.	22. Variable contrast paper.
	23. Types of surfaces.
	24. Weights of paper.

DO	KNOW
25. Make an enlargement using projection controls. List the procedures used and mount both in your notebook.	
26. Arrange trays.	26. How to make an enlargement.
27. Prepare chemicals.	
28. Use print scale.	
29. Develop and dry film.	
30. Spot printing.	30. How to do spot printing.
31. Dodging.	31. Definition of dodging.
32. Cropping.	32. Definition of cropping.
Film Developing	
33. Develop student roll of film.	33. Use and care of chemicals in - developer - stop bath - fixer - washing.
34. Take 3 pictures (6 ft. 30 ft.) and infinity. Present a different idea in each. Develop and contact print. Mount prints in notebook.	
Films	
	35. Types of films. - panchromatic - orthochromatic.
	36. Meaning of ASA Indices.
	37. Use of safelights and darkroom procedures.

DO	KNOW
	38. Procedures in tank developing. - loading the tank - developing procedure - drying and handling methods.
	39. Tray developing techniques.
Taking a Picture	
40. Critical analysis of pictures using composition principles as a guide. Bring a landscape shot for criticism.	40. Principles of composition. - simplicity - format - center of interest - major and minor motifs - framing - baseline - lines - color - lighting - front, back, cross - sun, shade, flash, natural.
41. Take a picture of a person outdoors. Keep a record of lighting conditions, mount print in notebook.	41. Procedures and problems in outdoor photography. - direct sunlight - shade - fill-in-flash.
42. Portrait of a boy or girl using flash bulbs or strobe.	42. Uses of flash photography.
	43. Types of flash bulbs. - classification - guide numbers.
	44. Use of electronic flash. - synchronization - rating.
45. Write a research paper on a phase of photography as a vocation.	45. Career opportunities. - commercial advertising - portraiture - nature photography - process cameraman - training required - industrial photography - police photography - display techniques.

Duplicating

Course Content

What the student should be able to

DO	KNOW
Spirit Duplicator	
1. From the manual make a list of the operating controls, the supplies and materials and their use.	1. Process and materials.
2. Without a stencil learn the operation of the machine. Place prepared stencil and run.	2. Press operation.
	3. Placing of stencil on machine.
4. Prepare a stencil.	4. Preparation of hand lettered or drawn stencil single color.
5. Type a stencil.	5. Preparation of a typed stencil, single color.
6. Run each size of stencil.	6. How to change machine from 8 1/2 x 11 to 8 1/2 x 14 stencil and changing paper stock to card stock.
7. Run card stock.	
8. Prepare and run a suitable stencil in colors.	8. Two color run not registered. Single lines.
9. Prepare and run a multicolor stencil with colored illustration in register.	9. Multicolor run registered in different color with an illustration.
Silk Screen	
10. Study prepared information sheets and become familiar with the tools and equipment, and their uses.	10. Application of silk screen tools and equipment.
11. Student to select the design and draw or trace it on paper.	11. How to prepare the copy.

DO	KNOW
12. Cut a stencil from a design.	12. How to cut the stencil.
13. Place fabric on printing frame and prepare frame.	13. How to prepare the screen.
14. Prepare and print film prepared for this purpose. - mount film - box in film - position and feed - print the design - clean the screen.	14. How to operate the equipment.
15. Prepare and print a book cover in two colors.	

RELATED TRADES

16. From the library or reference books trace the history of paper.	16. History of paper making.
17. Following the instruction sheets follow through and carefully rehearse the steps in making a sheet of paper noting the materials used and their order and purpose.	17. Steps to making a sheet of paper.
18. Make a sheet of paper.	
19. List as many samples of printed materials as possible. Find and bring to class as many different samples of printed materials as possible.	19. Types of paper, weight.
20. List the many job fields in Graphic Arts and discuss their future.	
21. Write a report on related process, letterpress, silk screen, photo gelatin, lithography and compare them.	

DO	KNOW
22. Read through the reference books making a list of the most commonly used terms in the areas one is working. Where possible sketch the tools. State the use of them.	22. Terms of trade in the areas covered by the course.

Teacher Preparation - the student is to be given a list of pages to read and study from each of the references. Each student at the end of the course be allowed to bind his own notes, complete with silkscreen or stencilled cover.

CRAYONSTONE LITHOGRAPHY

23. Prepare a report on the topic of Lithography.	23. History of Planography and Lithography.
	24. Tools used in Lithography.
	25. Principle of Lithography.
	26. Definition of Crayonstone Lithography.
27. Prepare a stone.	27. Gaining the stone.
28. Transfer a given pattern to the stone and color sketch.	28. How to draw on the stone.
29. Etch the prepared stone above.	29. How to etch the stone.
30. Etched stone to be completed and gummed.	30. How to gum the stone.
	31. How to dust the stone.
32. Practice printing methods until satisfactory results are achieved.	32. How to print from stone.
33. Prepare a stencil of student choice and proceed with necessary steps to reproduce this stencil.	33. Practical application to printing a book cover. Preserving image.

Teaching Helps

Advance Preparation - Teacher to have hand out sheets with this information to be distributed after the student has handed in report. A list of the tools together with their uses is to be prepared.

Advance Preparation - Pre draw stencils for students to transfer.

Advance Preparation - Information sheets, together with diagrams are to be prepared on each phase of Crayonstone Lithography.

References

1. C. W. Hague, Printing and Allied Graphic Arts, Bruce Publishing Co.

2. Kauffman, Graphic Arts Crafts, Van Norstrand.

3. Albert Koslaff, Art and Craft of Screen Processes, Bruce Publishing Co.

4. Darvey Carlsen, Graphic Arts, Charles A. Bennet Co. Inc., Peoria, Ill.

5. Careers in Graphic Arts, Graphic Arts Council, Ottawa.

6. Marinaccio and Osburn, Exploring Graphic Arts, Van Norstrand.

7. Information from Barber Ellis of Alberta Limited - Edmonton, Calgary (upon request).

POWER MECHANICS

Introduction

This course is designed to help the student develop a scientific understanding of the mechanical conversion of chemical energy to useful and profitable work.

It is necessary for the student to learn that understanding the principles of science and mechanics and their close relationship is imperative and must precede development of practical skills in the field of Power Mechanics. A general and broad knowledge of power and its application through the medium of mechanics can but be achieved through a sound and careful study of the basic and fundamental laws which govern the science of energy and its conversion to useful work. For this reason, the chosen area, the internal combustion engine and its place in the modern world, may well help the student solve and understand much that lies behind the science of mechanics and power.

Scope

This Power Mechanics course should focus on the applications of scientific concepts in technology. Parallels of the utilization of scientific concepts should be drawn between their use in Power Mechanics and other technologies wherever possible. Terms and practices used should be explained scientifically and also as they apply to other technologies.

This course will cover the study of gas, gasoline, diesel and oil engines. It will compare their differences and explain their purposes and applications. Emphasis will be put on the principles of operation, design and construction of the gasoline four-cycle engine.

Maintenance and Tune-Up

Course Content

DO	KNOW
1. (a) Develop a total cost chart for a piece of equipment - i.e. family refrigerator, automobile.	1. (a) Theory of maintenance including the following topic: - machine life (economics) - wear of components - moving and non-moving parts - machine efficiency - replacement of parts - inspection - safety.
(b) Perform an inspection on a complex piece of equipment - i.e. automobile.	
(c) Inspect body, doors, fenders, bumpers and all glass.	
(d) Hoist inspection of suspensions, springs, drive shafts, universal joints, engine mounts, exhaust system, fuel lines, oil pans, transmission and differential seals, brake lines and tires.	
2. (a) Perform lubrication of a complex piece of equipment - i.e. automobile. (b) Use lubrication charts. (c) Change lubricants - engine, gear-boxes. (d) Greasing and oiling. (e) Service of air cleaners, breathers and filters.	2. (a) The principles of lubrication including the following topics: - friction - requirements of a lubricant, speed, pressure, heat clearances, contaminants - kinds of lubricants, solids, graphite, molybdenum disulfide silicones, semi-solids as soaps, greases, liquids - sources of lubricants - petroleum industry.

3.	(a) Wash and wax vehicles using sponges, chamois, cleaning agents, solvents and proper waxes.	3.	(a) Protection. - paint - other coatings, undercoating, waxes - cleanliness.
	(b) Clean all glass, polish chrome, vacuum car interior and brush upholstery and door panels.		
4.	(a) Perform experiments with friction - sliding, rolling, wet and dry surfaces.	4.	(a) The principles of the various types of bearings - dissimilar metals, ball, roller, barrel, taper, nylon, teflon.
	(b) Disassemble and assemble and adjust different types of bearings - e.g. wheel bearings.		(b) The principles of minimizing of friction.
			(c) Pressure - direction of loads and preloading of bearings.
			(d) The appearance of serviceable and unserviceable bearings, cups, cones, bearing seals.
			(e) The importance of lubrication in anti-friction bearings, the difference in bearing types and the need for proper adjustment for clearance on all types of anti-friction bearings.

Instruction Sheets

Teacher prepared shop notes (Which are to be completed by students using prescribed references).
Lubrication Check Charts - All Oil Companies.

Power Sources

Course Content

1.	(a) Read and review information on the definitions of work, energy and power in suggested primary references.	1. (a) The meaning of work, energy, and power. (b) Measurement of work. (c) Measurement of power. (d) Calculating efficiency and power. (e) Physical properties of metals.
2.	Inspect, service, check, start and stop the internal combustion engine, which will include: (a) The one-cylinder two-cycle gasoline engine. (b) The multi-cylinder four-cycle gasoline engine.	2. (a) Differences among internal combustion engines. (b) Identify the necessary and visible components of the various types of engines.
3.	(a) Experiment with compression gauges, vacuum gauges on live multi-cylinder engines, both diesel and gasoline. (b) Experiment with vacuum tests on the venturi of the carburetor. (c) Take compression tests (both wet and dry).	3. (a) Principles of science involved in the intaking of air fuel mixture and compression of gases. (b) How to calculate compression ratios, laws which govern the intaking, compressing, and combustion, exhausting of gases.
4.	(a) Disassemble and reassemble simple single cylinder gasoline engines of two-stroke cycle and the four-stroke cycle. (b) Use necessary tools and orderly procedure in disassembling and assembling. (c) Maintain bench and work area with the neatness of the science lab.	4. (a) Understand differences in construction. (b) The need for precision and care in assembling. (c) The name and function of both stationary and moving components.

DO	KNOW
5. (a) Trace the lubrication system.	5. (a) Principles of lubrication and its relation to carburetion and cooling systems. (b) The operating principles of the various oil pumps. (c) Why by-pass and relief valves are used and understand the basic principle on which they operate.
6. (a) Trace and explore the cooling systems, both air and liquid. (b) Examine radiators, hoses, water jackets, thermostats, water pumps, fans and fan belts. (c) Perform experiments on the freezing points of various ethylene, glycol and water solutions.	6. (a) The need for cooling of power sources. (b) The principles of heat transfer-radiation, conduction, convection. (c) Methods of cooling and kinds of coolants - air, water, ethylene, glycol, liquid sodium. (d) Effects of pressure on boiling point. (e) Relationships between cooling system and lubrication and fuel systems.
7. (a) Disassemble, assemble, inspect, clean and check carburetors and simple fuel injection pumps. (b) Set carburetors, automatic and manual choke systems. (c) Set mixture controls on carburetors. (d) Disassemble and assemble the diaphragm type fuel pump.	7. (a) The scientific principle utilized in the preparation of fuel and air combustion, carburation injection. (b) The actions of the carburetor - venturi (Bernoulli's principle) automatic choke (bimetallic strips) circuits and mixture controls. (d) Safety procedures in handling fuels.
8. (a) Trace, examine, disassemble and assemble both the magneto and the battery ignition system.	8. (a) The need for ignition and the necessity of precision timing.

DO	KNOW
8. (b) Check battery ignition distributor mechanical and vacuum advance.	(b) The principles and operation of the ignition system - high voltage - low voltage - transformer - action of coil - condenser action.
(c) Trace complete ignition system, switch, distributor circuit, coil circuits and high voltage lines to spark plugs.	
(d) Examine, study and service the wet storage battery.	

Electrical System

Course Content

DO	KNOW
1. Ignition.	1. (a) The electron theory.
(a) Trace, inspect, study the entire ignition circuit. (Shop models) (All circuits).	
(b) Study, inspect, disassemble and reassemble complete distributor unit.	(b) Units of electrical measurement.
	(c) Ohms Law.
2. Generator.	2. (a) The definition of the generator.
(a) Disassemble, inspect, study and reassemble the generator (shop units).	
(b) Trace both field and armative circuits on the generator	(b) The principles of the generator.
	(c) Commutation.
	(d) Production of the magnetic field.
	(e) Theory study of regulation (brief).

DO	KNOW
3. The Alternator (a) Disassemble, inspect and study and reassemble the alternator (shop model Delcetron).	3. (a) Induction of alternating current.
(b) Trace and study rotor and stator windings and circuits on the alternator.	(b) Rectification of alternating current by the disc or diode type rectifier.
4. The Cranking Motor. (a) Disassembly, inspection, study and assembly of the electric starting or cranking motor.	4. (a) Definition of cranking motors.
(b) Trace field, armature and brush plate circuit of starting motor.	(b) The operation of the electric cranking motor.
(c) Inspect and study cranking motor drive mechanisms.	
5. The Auto Lighting System. (a) Inspection and study of switches. - manual - magnetic - reostat with thermostatic circuit, breaker - brake hydraulic switches.	5. (a) The principle of series and parallel circuits.
(b) Inspect, study and service fuses and circuit breakers (lighting and horn relay).	(b) The complete light circuit system.

Projects and Experiments

Preparation of complete circuit panel for shop study.
Group work and experimentation on actual shop models of all electrical equipment.

Power Transmission

Course Content

DO	KNOW
1. (a) Trace power flow through various mechanical devices i.e. automobile, tractors, earth moving equipment.	1. (a) The need for power transmission.

DO	KNOW
1. (b) Compare output with input of a power transmission system.	1. (b) Mechanical advantage, the relationship between force and distance - torque and speed. (c) Directional changes in power transmission. (d) Efficiency of power transmission - minimizing frictional losses.
2. (a) Disassemble, inspect, study, assemble and adjust various types of clutches.	2. (a) The need for disconnecting power flow. (b) Clutch systems - dog, sliding, gear, one way, centrifugal, cone single plate, multiple discs. (c) The principles of wet and dry clutch systems - friction materials area - pressure - mechanical and hydraulic controls. (d) Methods of engagement.
3. (a) Disassemble, inspect, calculate ratios and assemble various gear boxes. Represent all types of gearing e.g. automobile transmissions, truck transmissions, overdrives, motor scooter, power take-off steering boxes, rear axles, automatic transmissions.	3. (a) The principles of power transmission utilizing gears. (b) Calculation of gear ratios. (c) Types of gears - straight, spur, helical cut, bevel, spiral bevel, hypoid, worm, rack and pinion. (d) Arrangement of gears in gear sets - countershafts, idlers, planetary, differential, synchronized. (e) Cams - linear, disc, cylindrical, desmodramic.

DO	KNOW
4. (a) Inspect various kinds of drive trains.	4. (a) The principles of power transmissions utilizing shafts, rigid, flexible.
(b) Disassemble, inspect for wear, assemble and align a drive train using shafts e.g. automobile drive shaft.	(b) The need for shaft supports, bearings, mounting blocks.
	(c) Need for flexibility in the drive train - universal joints - couplers, constant - velocity U-joint, double yoke, Rzeppa, Birfield, Hardy - spicer/ZF.
5. (a) Inspect a belt drive for wear - belt - pulley.	5. (a) The principles of flat and "V" belt pulley systems.
(b) Adjust belt tension.	(b) The principles of chain drive - roller chains - toothed chains.
(c) Adjust pulley alignment.	
(d) Inspect chain drive for wear.	
(e) Adjust chain tension.	
6. (a) Inspect a closed hydraulic system - hydraulic brakes - tractor hydraulic system.	6. (a) The principle of a closed hydraulic power transmission system. (Pascal's Principle).
(b) Check for leaks.	(b) The function and principles of operation of various hydraulic pumps - plunger, centrifugal gear, rotor, vane.
(c) Bleed air out of a system.	(c) Utilization and control of hydraulic pressure - cylinders, valves - lines.
(d) Adjust controls and mechanical connections.	(d) The principle of dynamic hydraulics - Impellors, pumps, stators, turbines.
	7. (a) Other means of power transmission - electric - magnetic - pneumatic.

Projects and Experiments

1. Preparation of simple hydraulic systems (using hydraulic brake units and hydraulic steering pumps and cylinders).
2. Preparation of simple magnetic control units.
3. Plan and construct simple vacuum operated units (using power-vac brake assemblies).
4. Demonstration materials from industry as well as automotive components may be used to teach power transmission concepts.

Teaching Aids

Service Manuals	Available from: General Motors Limited Ford Motor Company Chrysler Corporation Limited.
Engine Charts and Plans	Available from: General Motors Limited Ford Motor Company Chrysler Corporation Limited Caterpillar Tractor Company International Harvester Company Ltd.
Films	Shell Oil Company of Canada Limited General Motors Limited.
Service Bulletins and Charts	Delco Remey Company Limited.
Catalogs and Service Bulletins	Motor Car Supply Limited Snap-On Tools Limited.
Service Bulletins and Manuals	General Motors Limited Ford Motor Company Chrysler Corporation Delco Remy Company Limited.

Cut-a-way models of all electrical equipment.

Instructional Helps

Projects and Experiments

1. Making of cut-away models of internal combustion engine components (which will in turn provide development of hand skills in filing, fitting, drilling, grinding, sawing and soldering).

2. Experimenting with self-made models of venturi tubes.
   Experiments with the prony-brake.
   Experimentation with self-made combustion chambers and self-designed high voltage ignition systems.

Instruction Sheets

1. Distribution of weekly prepared information sheets, designed as semi-finished notes. Such sheets to reveal the depth and scope of the course requirements.

2. Job sheets, instructing students of methods and procedures for disassembly and assembly of components, and stressing phases of major importance.

3. Question sheets on jobs or projects completed.

4. Assignment sheets for major weekly assignment.

5. A minimum of ten information sheets on the ten major areas of the course stressing the principles and laws involved in the operation of the unit concerned.

   In this course the information sheets should deal with:

1. Measurement of work, efficiency and power.

2. Operation of the internal combustion engine.

3. The principles of combustion.

4. Shop procedure.

5. Principles and properties of lubrication.

6. Cooling systems and their importance.

7. Carburetion.

8. Electrical induction.

9. The principles and laws of the internal combustion engine.

10. Auxillary power units and the transfer of power.

Demonstration Materials

Demonstration materials from industry may be used to an advantage for the teaching of power mechanics concepts. However, the following automotive components are easily obtained and may be used as a starting set of demonstration materials. Note the numbers suggested for the Industrial Arts General course (G) and the Cluster course (C).

E. SPECIAL UNITS FOR INDUSTRIAL ARTS GENERAL

Research

Introduction

"Research" is a word that appears frequently in educational and industrial publications.

Students need the opportunity, in their progress through the public school, to have some experience with the scientific approach to problem solving. Industrial Arts students in particular need to develop a fuller understanding in the area of industrial research. This ten week unit at the high school level will stimulate students to an interest in high level laboratory activities in their quest to satisfy their curiosity.

Background

A number of experimental classes have been conducted in a "Research and Experimentation" in the United States. One that is notable is the Montgomery Hills Junior High School experimental program conducted by Dr. Donald Maley and Alan P. Kenny. This program was based on the concepts presented in a manual written by Dr. Maley of the University of Maryland entitled "Experiments in Industrial Arts". Following is an excerpt from that manual.

"For years educators have been 'talking about meeting the needs of youth'. Industrial Arts teachers specifically have done much talking about meeting the needs of youth, and yet upon close examination of the 'Firing Line' or the actual teaching-and learning situation, there appears to be a tremendous gap between the verbalized theory and the practical techniques. Industrial Arts educators also have consistently boasted of the uniqueness of their teaching situation (the shop and its equipment, materials, and facilities). Yes, there is the presence of a unique learning atmosphere that is found no other place in the school. But, to what extent has this uniqueness come to bear on the pupil, teacher, or administrator, or on a sound program meeting the challenge of the fullest development of the individual?

"Perhaps the shop environment is an extremely unique learning situation and perhaps the proponents of the theories of 'pupil needs' are consistent with modern sound educational philosophy. Accepting these two ideas, one might conclude there needs to be a bit of 'gap filling' aimed at using both ideas or conditions toward the common end of meeting the needs of more of the students."

"A step in the right direction might be the identification of needs as they apply to all youth, as they apply to certain groups, and as they apply to individuals. Two facts were of extreme concern to the planners of the project from its inception. First, it is generally the practice that all boys in the junior high school take Industrial Arts. Secondly, it is generally agreed that most Industrial Arts programs deal chiefly in project making. These two facts might lead one to believe that all boys naturally want to make projects. However, there might be some question as to the validity of such a statement. And of course the nature and type of project made is in many instances without much decision, planning or control on the part of the student."

"On the other hand there is a different picture that one might consider, since most boys will pass through the shop program, it is entirely possible that many of our future experimenters, physicists, laboratory technicians, chemists, designers, and analysts will be among the group. It is possible that some of these people will early find the urge for experimentation with materials, tools and equipment. This urge for experimentation and analysis has frequently been evidenced wherever students have had the opportunity. The thesis here is that it is felt that there is within the school shop population a number of boys who have this desire and a need for encouragement and further development. They may not be interested in project making as such, but are bent towards critically evaluating materials and concepts that face them in their daily living. This then, is an educational need. It is a plan for a different type of a shop program aimed at satisfying the needs of those who have the interest, ability and aspiration towards such a program will be of decided value. This proposed program through experimentation is not to be the total shop program in any sense of the word. It is simply advocated as one of the facets which would go to make up a well-rounded program of Industrial Arts attempting to deal effectively with all the youth who enter into the program."

Purpose

The "research" approach is basically an attempt to put into practice what the best of educational psychology and practice tends to advocate. The purpose of this unit is to give a student the chance to pursue a problem of his own choice. The problems should all be selected by the students and it is the students' curiosity that provides the momentum for the program.

Method

This is a student-centered program. Rather than have teachers select problems for their students and lecture, demonstrate and make assignments, students themselves take the initiative.

"The pursuit of the problem by the student involves the development of a scientific approach to the object of his curiosity. He learns and practices the techniques of research. He uses the language of research -- statements of problems, hypotheses, assumptions, variables, findings, conclusions. He soon learns that reading, letter writing, telephoning, visiting, interviewing, and observing are some of the tools he can use in gaining the information he needs. And, above all, he soon learns that the sources of information may take him beyond the teacher, beyond the other teachers in the school, and beyond the county, (provincial) or national boundaries",-Maley in "Research and Experimentation."

Basic to the success of the program then, is the involvement of the student in his own problem. Guidance is provided on an advisory basis and through a series of seminars which are held during the time of the research. These seminars provide an avenue of communication and challenge among the young researchers. It is here that the communication skills are developed and the opportunity is provided for individuals to discuss each other's problems and help in their solution. During these discussions problems are raised, ideas suggested, information supplied and the completeness of the research tested.

Facilities

The multiple-activity laboratory provides an ideal facility for the constructing, testing and research activities that the students will need to do. A planning center such as the graphic communications room would serve well for the seminars, the library research, designing and planning and writing activities.

Outside agencies such as the school and public library, government agencies, industrial plants and institutions of higher learning would provide additional resources.

Procedure

A standard procedure should not become established and be used with each student. Different problems will demand variations in treatment. Each student and his research project are unique and should be treated with flexibility. However a few guidelines are suggested below.

1. Explain and outline the purposes and intent of the unit.

2. Explain the standard procedures used in research.
   (a) Selection of the problem or topic for investigation.
   (b) Definition and differentiation of specific aspects of the topic.
   (c) Collection of pertinent data.
   (d) Analysis and interpretation of the data.
   (e) Written report on the research study.

3. Students engage in study, constructing experimental apparatus and collection of data.

4. Seminars are planned to allow students to present their progress and problems. The resulting exchange of ideas should benefit all.

5. The evaluation of the program.

   The evaluation of the work of the students should be based upon the accomplishment of the goals originally set. Some criteria for evaluation follow:
   (a) Reasons for the selection of the problem.
   (b) Organization of the problem
       - outline of experimental procedure
       - effective use of time.
   (c) Recording of experimental results
       - method used
       - accuracy of procedures
       - completeness and thoroughness of the work.
   (d) Conclusions of the study.
   (e) Use and care of tools and equipment.
   (f) Individual growth as evidenced by the following personal qualities
       - self reliance
       - initiative
       - creativity
       - problem solving
       - resourcefulness.

References

Donald Maley, Research and Experimentation, University of Maryland pamphlet.

Kenny and Maley, Montgomery County, Maryland, Research and Experimentation In Industrial Arts, Montgomery Hills Junior High School, Silver Spring, Maryland.

Production Science

Introduction

How are items produced through mass-production? What type of organization and skills are required? This unit is a study and implementation of the production-line technique. It will include the human organization from the president to the salesman as well as the organization of the machines and energy to bring about the manufacture of a useful project.

The unit could be used as the fourth unit of a year's work at any grade level. Preferably the "production line" would incorporate a number of the craft and technical areas found in the laboratory so that the interrelationship of the technologies would become very evident.

The whole class would be organized as the "staff" required to complete the "run".

Course Content

What the student should be able to:

DO	KNOW
1. Make a chart showing the organization of the personnel in a small production plant.	1. The line and staff organization in a manufacturing plant. - lines of authority.
2. Organize class into - management personnel - planners and designers - foremen - production workers - sales personnel.	2. How staff qualifications and job specifications are determined.
3. Designers draw project for mass production.	3. How products are designed. - priced out; costs - market studied.
4. Management and planners develop flow chart for production of items.	4. Need for flow chart.
5. Foreman and production workers plan standardized procedures for fabricating individual components, setting tolerances, production run, etc.	5. Purpose of jigs and standardization.

DO	KNOW
6. Run a proto-type through the line.	6. Function of proto-types.
7. Set up one operation that is partially automatic.	7. How automation and cybernation are used to control machines.
8. List reasons for worker dissatisfaction resulting in strikes during the past year.	8. Labor problems. - wage scales - pensions - strikes.
	9. Need for government labor laws and minimum wage scales.
	10. Need for long term planning and research.

Suggestions

Have class design a small inexpensive project that cuts across several craft and technological areas. This might include wood, plastics and metal or sheet metal, plastics and electronics.

Projects might include:
- photoframes
- small transistor radio (vacuum form case)
- circuit testers
- book racks
- items needed in the school
- etc.

Example - The following is a summary of a mass production job carried out in the Ponoka School.

Stacking Tables (a Mass Production Job)

Operations:	Sawing	Drilling	Woodwork
	Bending	Brazing	Painting

Instructor made necessary jigs. A short time was spent familiarizing each boy as to his particular job. This involved 9 boys.

Woodshop: 2 boys on power saw cut 5/8 fir plywood to size
1 boy rounded edges
All 3 boys sanded edges and surfaces
All 3 boys sealed and varnished tops and edges.

Metal Shop: Boy 1: Cut pipe to length on power hack saw (length jig.)
Boys 2 and 3: Bent pipe to form (Jig and stops) on bender.
Boy 4: Drilled holes in cross braces.
Boys 5 & 6: Assembled parts in jig, clamped and brazed parts. Two torches used, one at each end of frame.
Boys 1 and 4: Made minor adjustments, cleaned joints, spray-painted frames.
Boys 2 & 3: Carried in wood tops and aligned frames to them (jig).
3 boys from Wood Shop fastened frames to tops, using spiral screw drivers.
Boys 1 & 4: Put on rubber tips.
Boys 2 & 3: Stacked table in the required allotments for delivery.

Results: 60 stacking tables in 10 double periods.

Hot Metals

Acetylene Welding

DO	KNOW
1. Examine diagrams of welding equipment, tips and cutting torch.	1. History of welding. The tremendous effect of welding and its techniques upon industry. Methods of making and storing acetylene and oxygen, old and new. Cylinders. Regulators and torches.
2. Study oxy-acetylene outfit.	2. The great dangers associated with oxygen and acetylene.
3. Light a torch.	3. How to adjust pressure to get neutral, oxydizing and carbonizing flames and their uses.
4. Join two pieces of 1/8" mild steel.	4. Different methods of preparing the base metals. - welding methods - the torchad or puddle weld.
5. Break the weld.	5. Difficulties of full penetration.

DO	KNOW
6. Make a number of welds, horizontal and vertical. Re air students' broken equipment where possible.	6. The main uses of oxy-acetylene welding in in ustry. Pipe lines, etc.
7. Cut steel using cutting torch.	7. How to use the cutting torch. - cutting with pure oxygen - cutting machines used in industry - pantograph and electronic tracer - cutting cast iron and other metals - the oxygen lance.
8. Brace weld a casting.	8. The technique of braze welding.
9. Braze together two steel parts.	9. How cupilliary attraction is used to distribute brass in brazing.
10. Silver solder two pieces of metal together.	10. Uses in industry. Fluxes required.
11. Study diagrams of different types of equipment and that in shop.	11. The basic types of AC and DC generators. The action of the arc in depositing metal. AC DC straight and reverse polevity welding. The industrial implications of arc welding and its enormous increase in the last few years.
12. Strike an arc and run a bead.	12. Classification and colour coding of electrodes for various welding operations. Set up the welding equipment. Correct heat and arc length for varying rods and conditions. How to hold an electrode, strike an arc and run a bead. Dangers inherent in this operation.
13. Join two pieces of metal in horizontal position. Butt, lap and tee.	13. Techniques of making a good weld.
14. Make a vertical and overhead weld if students are sufficiently able.	14. Know some of the difficulties faced by many welders in industry.

DO	KNOW
15. Weld up project or repair equipment for the students.	15. The wide range of use of their new found skill.
16. Study a number of objects cast in various metals by different techniques.	16. The extent of the founding industry. Types of casting. Sand, permanent moulding, investment or lost wax, centrifugal, shell molding and die casting. (Note might be made of explosive and magnetic forming which are sometimes considered as casting techniques). Occupations in the industry. Kinds of foundries.
17. Take a simple object and compress between two cuttlefish shells. Make shells into a simple mold.	17. The main principles of casting. The use of this type of casting for jewelry and in earlier times.
18. Make a model in paraffin wax. Use as a pattern and cast.	18. The lost wax process. Its use for jewelry, art works and in industry for small, short run production.
19. Design a simple project for sand casting.	19. Metals available for shop casting. Type metal, corebond, lead, aluminum. Reasons for shrink rule. Need for draft and rounded fillets.
20. Make up a pattern.	20. Material suitable for pattern making. Pattern making as a trade.
21. Prepare molding sand and flask.	21. Types of casting sand. Equipment used in casting.
22. Prepare the mold for casting.	22. How to make the mold. The use and preparation of cores.
23. Cast the mold.	23. Heating the metal. Use of furnace and crucible. Dangers of molten metal especially with water. Methods used in industry.

DO	KNOW
24. Clean up and finish the model.	24. Processes used in finishing sand castings. Advantages of techniques which need little or no finishing.
25. Show a film of an industrial operation.	25. The similarities and differences between this work in the shop and in the factory.

Building Construction

Course Content

What the student should be able to:

DO	KNOW
1. Do exercise requiring the reading of building plans.	1. How to read architectural symbols and lines.
2. Develop the organization of a company.	2. How buildings are planned. - responsibilities of architect - responsibilities of draftsman - financing problems - building costs - job opportunities in drafting and architecture.
3. Choose a location and perform the actions of purchasing a lot.	3. How to choose a site. - securing a lot - what makes a suitable location - zoning laws.
4. Write out a list of steps to follow in the order a building would be completed.	4. How to plan the construction. - purchase of materials - use of sub-trades.
5. Use transit or tape and level to square and level footing forms. (One side only).	5. How to layout a footing.
6. Mix small concrete sample.	6. Basic form design - concrete.

DO	KNOW
7. Cut floor members: - joists and headers - bracing - subfloor.	7. Parts of a floor. - types of sills - names of members - use portable hand saw.
8. Frame a wall with - door - window.	8. Wall framing - doors - windows - nailing.
9. Place ceiling joists. - mark carefully in relation to rafters.	9. How to mark for ceiling joists.
10. Cut a rafter.	10. How to cut a common rafter. (Use a framing square).
11. Nail rafter.	11. How to nail rafters properly.
12. Nail sheathing - wall - roof.	12. Sheathing types - placement - nailing.
13. Describe samples of various exterior finishing materials used in construction.	13. Exterior building finishes.
14. How to lay shingles.	14. How to cover a roof. - types of coverings.
15. Complete portion of walls with drywall, tape and fill.	15. How to finish the interior of a house. - types of finisher - plaster - drywall tips - wood panelling.
16. Study examples of different finishing jobs. Make a list of things to watch for which indicate good craftsmanship.	16. How to do finish carpentry. - hanging a door - baseboards - moldings.
17. Sharpen - a plane - a chisel - a gouge - lathe chisels.	17. How to condition tools. - sharpen - adjust.

DO	KNOW
18. Check general condition of machine tools. - bearings - belts and pulleys - adjustments.	
19. Find samples of materials of different grades.	19. Grading of Canadian construction woods.
20. Interview a construction contractor to discover - type of training he wants for his employees - skills required - working conditions - job security - how to apprentice - pay rates - how to join a union - how Workmen's Compensation functions.	20. Occupational information.
21. Make several trusses (own design) and test strength.	21. Methods of trussing - design - material.

Suggested Activities:

Small buildings such as dog house, playhouse, garden house, granary. Expendable exercises such as framing a corner, including a window and part of roof.

Food Science

Introduction

To protect his health and build an efficient body, man needs to give more thought to his diet. Cattlemen and trainers of race horses place great emphasis on the scientific balancing of diet and on the measuring of rations to produce the best results in their animals. It would seem sensible then to study the comparison of goods and the nutritional needs of human beings.

Objectives

1. To develop reasons for safety and sanitation in the kitchen.

2. To develop keener and more intelligent interests in maintaining sensible food habits, and good buying habits.

3. To develop the ability to plan, prepare and serve adequate attractive meals for a moderate cost.

4. To develop judgement as to reliability of sources of health information (fads or facts).

5. Operation of modern kitchen equipment.

6. Working knowledge of cooking terms, china and silverware terms and the proper use of each.

7. To evaluate the desirability of home preservation of foods in relation to various factors.

8. To evaluate the various methods of home preservation of foods.

9. To understand the principles of food spoilage.

10. To understand the principles of food preservation.

11. To develop the ability to evaluate the commercially preserved foods and their uses in the home.

Course Content

What the student should be able to:

DO	KNOW
1. Pupils make safety check of room and equipment. Wear proper dress. White aprons and white shirts, chef hats or bands.	1. Safety procedures. Safe work habits in relation to dress, traffic lanes and equipment.
2. Practice procedure for treating cuts, burns and scalds.	2. Procedures to be used in case of accidents such as cuts from knives, broken glass, china, burns and scalds.
3. Clean up broken glass and grease spills, etc.	
4. Launder dish towels, dish cloths, aprons. Need for clean clothes. Use of soaps and detergents. Bleaches, chlorine, perborate.	4. Understand sanitation in care, handling and purchasing of foods.

DO	KNOW
	5. Fire drill - use of fire extinguishers.
6. Clean work areas, refrigerators, stoves.	6. Personal cleanliness.
7. Insect control.	7. Know what kind of detergent to use for the job to be done. High sudsing or low sudsing.
8. Personal cleanliness.	
9. Purchase safe foods from sanitary sources. Pasteurized milk, government inspected meats.	9. Protection of foods.
	10. Storage.
	11. Disposal of waste and garbage.
	12. Understand the spread of infections by food handling and by personal habits.
Fruits	
13. Serve raw and cooked fruits.	13. Importance of fruit in diet. Minerals, vitamins. Why a source of vitamin C is so important.
14. Make fruit desserts, fruit cups, apple crisp and fruit juices.	
15. Serve, cook dried fruits (prunes).	15. Value in fresh, frozen, canned, dried and in season fruits. Prices compared to availability and work needed to serve.
Milk	
16. Show film on milk and dairy products.	16. Ways to buy milk.
17. Milk and value of milk in diet.	17. Care of milk, uses of milk.

DO	KNOW
18. Study properties of a quart of milk.	18. How to cook with milk.
	19. Value of cheese in diet.
20. Make milk puddings, custards, sauces, gravies and milk shakes.	
	21. Cheese making and cooking.
22. Macaroni and cheese. Ice cream.	22. Ways of mixing cheese with other foods.
Management	
23. List foods eaten for a 24 hour period.	23. Why food is important to both the individual and the family. Diet needs of each different member.
24. Compare with Canada's Food Guide.	24. Canada's Food Guide.
25. Check caloric content for age and occupation.	25. Facts and fads in foods.
26. Plan a week's menu for a family of four.	26. Types of breakfast and caloric content.
27. Make a light, medium and heavy breakfast.	27. Why breakfast is so important.
28. Make quick breads.	28. Uses of quick breads in the diet.
29. Compare a ready mix with at home mix.	
Meats	
30. Cook various cuts of meat, tough and tender cuts, make gravy and soups from stock.	30. Meats, kinds, structure, grades, care, and selections.
	31. Reasons for toughness. Methods of cooking tough and tender cuts of meats.

DO	KNOW
32. Visit butcher shop to see meat cut up and name the pieces.	32. Comparative food values of tough and tender cuts, compare prices. Operate special parts of stove.
33. Carve meats, rotisiere a chicken, broil, pan fry and stew meats.	
Vegetables	
34. Prepare raw vegetables for eating.	34. Value of vegetables in the diet.
35. Consider food values, color, flavor, texture, arrangement and cost.	35. Buying, choosing, storing, caring and cooking vegetables.
	36. Study buying guides for vegetables.
37. Cook vegetables to conserve nutrients.	
38. Make salads.	38. Kinds of salads and dressing. Protein, fruit, starch, green and gelatine. Appetizers, accompaniment, main dish and dessert.
Eggs	
39. Cook eggs various ways.	39. Composition, structure and food value of eggs. Grades and tests for freshness. Methods of cooking eggs, digestibility of eggs.
40. Prepare meals for cafeteria using food models and flannel board.	40. Know the difference between good and poor meals in nutrients as well as dollars and cents.
41. Check prices and calories.	
Food Preservation	
42. Discuss methods of home storage.	42. Reasons for food preservation. Flat, sour, swell, botulism.
43. Discuss methods of preservation other than those tried.	43. Causes for food spoilage micro-organisms, molds, yeasts, bacteria.

DO	KNOW
44. Use pressure cooker, open kettle, oven pack, cold pack, boiling water bath, prepare syrups, thin, thick, medium.	44. Know steps in canning.
45. Evaluate home canned fruit. Compare with commercially canned products as to quality, cost in money, time and energy.	45. Know the reasons for using: - pressure cooker - quick freezing.
46. Can non-acid vegetables and protein foods.	46. Reason for sterilization of jars, sealing, processing and storing.
47. Prepare foods for freezing, package, use: - sugar syrups, dry sugar - no sugar or syrups - blanch vegetables - dry pack, brine pack.	47. Know foods suitable for freezing, vegetables, fruits, meats, baked products.
	48. Know why you blanch vegetables.
50. Label containers and date.	49. Know the best pack.
	51. Know the methods of thawing and cooking frozen products.
52. Preserve by - drying -- salt, sugar acid, smoke, saltpeter, spices, boric acid, salicylic acid, sulphur dioxides.	52. Know other methods of preserving: antibodies, radiation, and ultra-violet radiation.

Optional

Jelly Making

53. Take pectin tests.	53. Know essentials in jelly making: pectin, acid, sugar. Test for pectin. Extraction of juices (jelly bag).
54. Make jelly using: - fruit juices only - fruit juices with added pectin.	
55. Compare jellies as to quality, quantity, cost, time and energy.	55. Fruits best for jelly making. Methods of making jelly. Plate test, sheet test, thermometer.

DO	KNOW
Pickles	
56. Discuss salt as a preservative.	56. Uses of salt, vinegar, and spices.
	57. Effect of iodized salt on pickles. - kinds of vinegar - use of alum.
58. Discuss utensils used in pickling.	
59. Make as many varieties of pickles as time allows.	
	60. Difference between home made and commercial pickles. Cost, time and quality.

Testing and Experimentation

The following suggestions may be used with the appropriate unit.

MECHANICAL

A. Stress/Strain

1. Hooke's Law

2. Non-destructive tests
   a. tension
   b. compression
   c. shear

3. Destructive
   a. tension
   b. compression
   c. shear

B. Hardness

1. Birnell

2. Rockwell

C. Toughness/Ductility

D. Impact

E. Fatigue

F. Crystal Structure

1. Cubic

2. Hexagonal

3. Rhombic, etc.

G. Phase Diagrams

H. Electronic & New Methods

1. X ray

2. Gamma ray

3. Ultrasonic

4. Magnetic

5. Magnaflux

6. Polarized light

I. Stress Concentrations

ELECTRICAL

A. Components

1. Resistivity

2. Capacitance

3. Inductance

4. Reactance

5. Dissipation Factor

B. Vacuum Tubes & Semi-Conductors

1. Emission

2. Transconductance

3. Alpha, Beta

4. Leakage

5. Curve tracing

C. Systems Control

1. Frequency; frequency response curves

2. Wavelength

3. Distortion
   a. harmonic
   b. intermodulation
   c. hum

4. Signal to noise ratio

5. Gain

6. Square-wave rise time

7. Reliability

8. Counting checks

9. Bolometer antenna gain & radiation tests

CHEMICAL

A. Composition

1. Impurities

2. Additives

3. Isotopes

4. ph Factor

5. Alloying

6. Assay control

7. Plating

8. Catalysts

B. Structure

1. Melting/boiling point
2. Colour
3. Odour
4. Taste
5. Thermal conductivity
6. Density
7. Porousity
8. Optical properties
9. Dimensional stability
10. Molecular structure (plastics)

C. Stability

1. Corrosion
2. Oxidation
3. Aging
4. Heat resistance
5. Reaction stability
6. Reagent economy

REFERENCES

Wood

1. Groneman, Chris H., General Woodworking, Canadian Edition, 1965, McGraw-Hill.
2. Feirer, John L., Industrial Arts Woodworking, 1965, Chas. A. Bennett Co.
3. Feirer, John L., Advanced Woodwork and Furniture Making, 1963, Chas. A. Bennett Company.

4. Miller, Hand and Machine Woodwork, 1962, MacMillan.

5. Lair, E.A., Carpentry For the Building Trades, 1953, McGraw Hill.

Metal

1. John R. Walker, Modern Metalworking, 1964.

2. Fraser and Bedell, General Metal, 1962, Prentice-Hall of Canada.

3. Fundamentals of Machine Shop, Sturi.

4. Sheet Metals Principles, Sturi.

5. Industrial Arts for General Shop, Olson.

6. Machine Tool Metalworking, Ferier A. Tatro, 1961, McGraw Hill Co. Inc.

7. Machine Shop Training, Krar A. Amand, 1962, McGraw Hill of Canada Ltd.

8. Machine Shop Theory and Practice, Hallett, 1961, MacMillan Co. of Canada.

9. Workshop Technology, Chapman, 1961, Edward Arnold Ltd.

10. How to Run a Shaper.
How to Run a Lathe.
How to Run a Milling Machine.
South Bend Lathe Works, South Bend 22, Indiana, U.S.A.

11. Arc Welding Lesson - Lincoln Arc Welding Foundation.

12. Welding Help for Farmers - Lincoln Arc Welding Foundation.

13. Procedure Handbook of Arc Welding Design and Practice - Lincoln Arc Welding Foundation.

14. Forging and Welding - Robert E. Smith - McKnight and McKnight.

15. Modern Welding Practice - Althouse and Turnquist - Goodhead-Wilcox Publisher.

Plastics

1. C.I.L. Publications handled by United Plastics Limited.

2. Swanson, Plastics, McKnight and McKnight.

3. Cherry, Raymond, General Plastics, 3rd Edition, McKnight & McKnight.

4. Groneman, Chris H., Plastics Made Practical,
Bruce Publishing Company.

5. Steele, Gerald L., Fiberglass Projects and Procedures,
McKnight & McKnight.

6. Lappin, Alvin R., Plastics Projects and Techniques,
McKnight & McKnight.

Ceramics

1. Roy, Ceramics, McGraw-Hill.

2. Mitchell, Ceramics,Stone Age To Space Age, National Science Teachers Association, 1201 - 16 Street, N.W., Washington 6, D.C., 1965, 50 cents.

3. Thompson, Selley, Activities in Ceramics.

Leather

1. Cherry Raymond, General Leathercraft, General Publishing Co.

2. Zimmerman, Leathercraft, Goodheart-Willcox Co. Inc.

3. Groneman, Leathercraft, Charles A. Bennett Co. Inc.

4. Al Stahlman, How To Carve Leather, Tandy.

Art Metal

1. C. Vernon Siegner, Art Metals, General Publishing Company.

2. Fraser-Bedell, General Metal, 1962, Prentice-Hall.

Lapidary

1. Duke, H.C., The Art of Gem Cutting, Minerologist Publishing Company
Portland 14, Oregon - $2.00.

2. O'Brien, How To Cut Gems, 1116 North Wilcox Avenue,
Hollywood 38 - $1.10.

3. Sinkankas, Gem Cutting, D. Van Norstrand Co., Inc.
Princeton, New Jersey - $13.00.

Textiles

1. Fiber to Fabric, Potter and Corban.

2. Fabrics, Denny.

3. Experiences With Clothing, L. Belle Pollard.

4. Library, C.I.L.,Teaching Aids Catalog.

Electronics

1. A. Markus, Basic Electricity, Prentice-Hall.

2. A. Markus, Basic Electronics, Prentice-Hall.

3. Thwaits, Fundamentals of Electricity, McGraw-Hill.

4. Buban Schmitt, Kirchner, Electricity and Electronics, McGraw-Hill.

5. Gerrish, Howard H., Electricity and Electronics, Goodheart-Willcox.

Printing

1. Stillman,Neil - Industrial Arts Work Units in Graphic Arts, Still Man Associates, 25 Sherborne Avenue, Lancaster, New York - $1.25.

2. Jackson - Printing - A Practical Introduction to Graphic Arts, McGraw-Hill.

3. Hayne, C.W., Printing and Allied Graphic Arts, Bruce Publishing Co.

Drafting

1. French and Swenson, Mechanical Drawing, McGraw-Hill.

2. Stirling, Technical Drawing, Macmillan.

Photography

1. McCoy, Robert A., Practical Photography, McKnight & McKnight.

Power Mechanics

1. Stephenson, George E., Power Mechanics, Delmar Publishing.

2. Automotives Essential, Ray F. Kuns, The Bruce Publishing Company.

3. Duffy, Joseph W., Power, Prime Mover of Technology, 1964, McKnight and McKnight.

4. Crouse, William H., Automotive Mechanics, 5th Ed., McGraw-Hill.

5. Short Stories of Science and Invention - General Motors Manuals
   General Motors Products of Canada
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   Oshawa, Ontario.

6. National Fluid Power Association, P.O. Box 49, Thiensville, Wis.

Food Science

1. Pollard, L. Belle, Experiences in Foods.

2. Hugh, Introductory Foods.

3. Sharing Family Living.

4. Balderson, Housekeeping Handbook - How To Do It.

5. Betty Crocker Cook Book.

6. Gas Co. Recipes and Instruction and Operations.

Filmstrips and Films

REFERENCES

Metals

1. McGraw Hill of Canada Limited, 253 Spadina Road, Toronto - Filmstrips.

2. Jim Handy General Films Limited, 1534 Thirteenth Avenue, Regina.

3. Canadian Copper and Brass Development Association, Room 1101, 55 Yonge Street, Toronto.

4. Aluminum Company of Canada, Department of Information,
1700 Sun Life Bldg., Montreal 2, P.Q.

5. Tempil, Basic Guide to Ferrous Metalurgy (Chart),
from Welco Welding Supplies, Montreal, Toronto, Quebec.

Filmstrips - Learning Farm Welding with the Arc Welds -
Lincoln Welding Foundation.

- Always on the Job - 20 min. filmstrip with record -
Air Reduction.

- Industrial Gases & Shield Arc Welding - 27 min. color-
sound - Air Reduction.

- Nothing But the Best - 20 min. color-sound - Air Reduction.

- Tools of Many Uses - 18 min. color-sound - Air Reduction.

Movie - Fundamentals of Manual Shielded Arc Welding Techniques -
2 - 20 min. reels color-sound - Air Reduction.

Welding Charts - Lincoln Arc Welding Foundation, 180 Duke St., Toronto.

Welding & Cutting Manual - Linde Company of Canada, Division of Union
Carbide Company of Canada.

Charts, booklets, etc. - Canadian Welding Bureau, 1393 Yonge Street,
Toronto 7, Ontario.

Films

Krafts Film Strips
McCall Film Strips
Carnation Film Strips
Films from Department.

SOURCES OF SUPPLIES

Plastics

Cope Plastics Illinois, Inc.
Highway 100
Godfrey, Illinois.

Crystal Glass & Plastics, Ltd.
130 Queen's Quay at Jarvis St. - (Dist. for
Toronto, Ontario. Plexi-Glass)

Kidder Manufacturing Co.
75 Crockford Blvd.
Scarborough, Ontario.

Lewiscraft
284 King St. West
Toronto 2B, Ontario.

Natcol Plastics
P.O. Box 299
Redlands, California 92374

Taylor Plastics Ltd. - (Dist. for
733-735 10th Ave. S.W. Perspex)
Calgary, Alberta.

The Castolite Co.
Woodstock, Illinois.

United Plastics Ltd.
9531 - 111 Ave. - (Dist. for
Edmonton, Alberta. C.I.L.)

Warehoused Plastics Sales
571 Gerrard St. East
Toronto 8, Ontario.

Ceramics

Plugged Clay - Sunburst Ceramics
Medicine Hat, Alberta.

Plainsman Clays
P.O. Box 15
Medicine Hat, Alberta.

Chemicals and Supplies - Alberta Ceramic Supplies
8520 - 67th Avenue
Edmonton, Alberta.

The Pottery Supply House
Box 192
Oakville, Ontario.

Wood

Fyfe Smith Hardwood
3640 - 7th St. N.E.
Calgary, Alberta.

or

11203 - 120th St.
Edmonton, Alberta.

Leather

Tandy Leather Co.
519 Centre St. S.
Calgary, Alberta

or

9757 Jasper Ave.
Edmonton, Alberta.

Textiles

Local Stores
Textiles - Patons and Baldwin - Wool
Better Business Bureau pamphlets
A Good Buy Practice
Household Finance Booklet on Money
Management and Clothing Budgets
Classroom Aids for Teachers (Free and up to date information).

EQUIPMENT

See equipment lists and as below:

Plastics

Tools and Equipment

1. Woodworking hand saws.
2. Woodworking layout equipment.
3. Assorted files.
4. Common woodworking power tools.
5. Oven.
6. Buffs.

Textiles

1. Sewing machines, stoves, fridge, washer.
2. Pressing equip., irons, ironing boards, etc.
3. Small equip. found in most Home Ec. rooms.
4. Cotton science kit -- $25.00.

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ALBERTA DEPT OF EDUCATION
CURRICULUM GUIDE FOR
INDUSTRIAL ARTS GENERAL
NL 40170913 CURR HIST